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REVIEW ARTICLE

The role of dentistry in treatment of obesity – Review

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Abstract *Introduction/objective*: Jaw Wiring (JW) is one of the controversial treatment modalities for obese individuals. It aims at limiting the food intake of the patient resulting in weight loss. The authors conducted a literature review to explore the historical development, effectiveness, indications, advantages and disadvantages of Jaw Wiring (JW) as treatment modality for obese individuals.

Data sources: PubMed, Scopus, Medline and Google Scholar have been searched for papers that addressed the effectiveness of JW in the treatment of obesity since 1979 till present. No restriction regarding the type of the articles has been considered.

Results: JW as a method of obesity management is a highly controversial issue. Almost all papers are retrospective, uncontrolled trials with a small sample size or anecdotal opinions. However, current data indicate that although JW is efficient in weight loss relatively faster than other treatment modalities, weight regaining is a constant finding in approximately all patients after JW discontinuation. Aspiration of vomit, gingival diseases, teeth decalcification and temporomandibular disorders are potential side effects. Such extreme treatment method should be approached carefully in a properly selected category of obese patients.

Conclusion: JW is an efficient way in terms of weight control in properly selected obese patients and usually no serious complications could be encountered through the treatment course.

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Contents

1. Introduction

Obesity has been one of the most difficult medical challenges in the past 3 decades that entails medical, physiological, psychological and economic problems. A prevalence rate up to 14% among adults worldwide was reported.[1] Body mass index (BMI) is calculated by dividing individual's body mass by the square of their height.[2] This indicator is commonly used to evaluate how much the individual's weight deviates from normal. Three grades of obesity were defined according to BMI,[3] Grade one obesity (BMI from 30 to 35), Grade two obesity (BMI from 35 to 40) and Grade three obesity (BMI over 40). Several types of pathological disorders were linked to obesity especially Grade three (morbid obesity) such as risk of developing cardiovascular diseases, diabetes, certain types of malignant tumors, hypertension, breathing complications, dyslipidemia, male infertility and depression.[4–6]

Obesity has been successfully treated by many modalities that include but are not limited to surgical interventions (bariatric surgery and liposuction),[7,8] anti-obesity drugs,[9] low energy diet,[10] physical activity,[11] psychological and behavioral modification of life style,[12] and genetic make-up.[13] However, unusual and uncommon treatment approaches were documented in the literature such as obesity vaccine and Jaw Wiring (JW).[14–17]

Scarce data exists in the literature regarding JW as a treatment modality for obesity, therefore we aimed in this article at reviewing the history, indications, techniques, advantages and disadvantages of JW. Jaw Wiring is defined in Segen's Medical Dictionary as "An extreme treatment for morbid obesity that utilizes the same methods and devices as those used for jaw fractures, allowing only the intake of liquids".

First attempt to treat obese individuals by JW was conducted by Rodgers and coworkers in 1977. They evaluated very obese individuals after a period of JW and reported that all patients have lost a significant weight (average of 25 kg in 6 months) which was comparable to bariatric surgery.[17] However, more than 70% of patients regained weight after discontinuing JW and only one patient maintained ideal weight.[15] Identical findings were reported in another study which involved 14 female obese patients that underwent JW for six months.[16] Weight regaining after abandoning of JW seems to be a potential limitation, however in short term follow up (4–14 months) for 7 patients who lost 31.5 kg during JW, a mean of only 5.6 kg was regained. It should be mentioned here that a nylon cord wrapped around the waist of the patients after weight loss in order to act as a psychological barrier to weight gain was applied to all patients.[17]

2. Indications

No obvious and clear-cut indications of JW were found in the literature for the treatment of obesity, however some relative indications from previous studies could be mentioned:

1. Obese patients with a BMI more than 35, and under 50 years of age.[17] Jaw Wiring is an extreme procedure, so it is probably limited to very obese individuals who initially rejected the surgical approach as first line of treatment; The age factor could be of concern as older patients have more periodontal problems that may be exaggerated by JW and they are less tolerant to impaired jaw function.
2. Obese patients that could not have surgical intervention because of associated medical problems. It is well documented in the literature that very obese patients show a wide spectrum of health problems that may compromise the surgical option.[4]
3. Overweight individuals who are under diet programs and willing to lose weight in a faster way.

All patients selected for this approach should meet the following criteria before commencing JW.

a. Healthy dental and periodontal structures[17] to avoid further damage of the dentition either directly by the wiring procedure itself or indirectly by accumulating of plaque and debris in wired areas.
b. Well motivated patient. Psychological adaptation is a crucial factor in the acceptance of prolonged jaw immobilization and severe limitation of masticatory function. Moreover, motivation is mandatory in obtaining a high standard of oral hygiene throughout the treatment period.
c. Physician consultation.
d. Dietician consultation.
e. Informed consent.

3. Techniques

The main principle of JW is to prevent normal jaw movement which limits the masticatory function leading to a severe reduction of food intake and calories. The ultimate goal is to lose

weight by creation of an imbalance between amount of calories intake and calories consumed in daily activities favoring the loss over gain. Two main techniques for JW could be identified.

3.1. Conventional JW

This technique was first appeared in 1977[17] and involves using 0.009 inch stainless steel wires that passes between interdental spaces of maxillary and mandibular molars under local anesthesia The wire should be harder than wires that were used in fixation of mandibular fractures to resist stronger jaw movement of healthy jaws.

Complete immobility of jaws should be avoided to prevent TMD problems. In addition, wires should be removed at monthly intervals for 48 hours before rewiring. In addition to the aggressive nature of this maneuver, the risk of periodontal inflammation is high especially in individuals with pervious gum diseases or less than optimal oral hygiene. Currently, this technique has been abandoned and replaced by Orthodontic JW (OJW).

3.2. Orthodontic JW

This modern and relatively elegant technique was first introduced by Dr. Ted Rothstein in 1998.[18] It is obvious that bonding of orthodontic brackets or buttons on the buccal surface of the upper and lower teeth offers an attachment for JW that avoids the aggressive procedure associated with conventional JW and risk of trauma to gingiva or periodontal structures.

Begg brackets are theoretically preferred as their vertical slots facilitate the wiring[18] (Fig. 1). However, any type of modern brackets designs (preferably with hooks) would be sufficient for such wiring. Usually, premolars and canines are bracketed (Fig. 2) and 0.012 inch dead-soft stainless steel wires are usually used to lace upper and lower brackets together starting from distal to mesial where wires are tied at the lower canine area (Fig. 3). Again, complete jaw immobility should be avoided and 2 mm of free movement in all directions is strongly recommended and that could be achieved by asking the patient to bite on a plastic straw throughout the wiring procedure (Fig. 4).[18] Elastics as a replacement for wires are contraindicated in order to avoid the extrusion and buccal flaring of teeth and subsequent bite opening. Aesthetic brackets at upper canines are recommended especially if the patient is keen for a metal bracket appearance (Fig. 5).

Figure 1 Begg brackets.

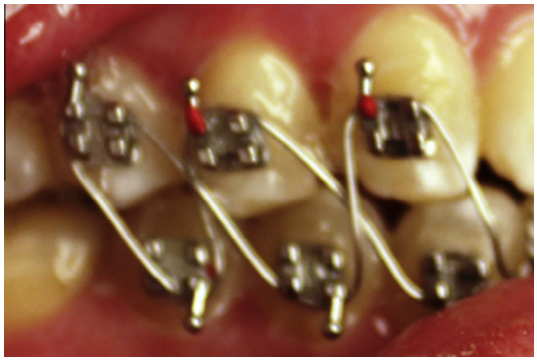

Figure 2 Brackets with hooks are preferred in JW.

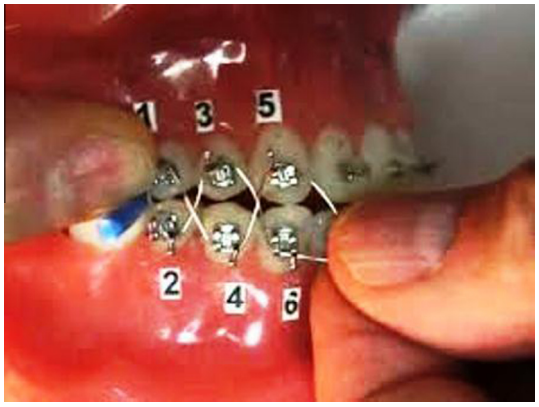

Figure 3 Wire is laced distally and proceeding mesially to lower canine area.

Figure 4 Plastic straw between teeth during the JW procedure.

Accurate bracket placement based on Facial Axis of Clinical Crown (FACC) and Facial Axis point (FA) as recommended by Andrews[19] is not necessary for OJW as the aim of brackets is not to align teeth. However, it is wise to have each bracket on its specific tooth in order to allow for maximum tooth/bracket adaptation and prevent frequent unwanted Deboning.

Like conventional JW, wires should be removed each 5 weeks for 2 to 3 days to allow for jaw exercises by normal speech and mastication. Unlike conventional JW, the rewiring procedure could be done by the patient him/herself after

Figure 5 Ceramic bracket at the upper canine for aesthetic purpose.

concise training at the first visit; this is a useful approach for patients that are not able to return back each month for wires removal and rewiring. Wires are removed when the targeted weight is reached that might take several months.

4. Advantages of JW

As mentioned previously, JW is potential substitution for aggressive surgical intervention and its subsequent complications. In addition, it provides a compliance-free method for weight reduction in very obese patients. Weight loss is rapid in patients with JW in comparison with other methods such as exercise and life-style modification.[14,15] The advantage of OJW over conventional JW is the possibility of self-rewiring making it a useful technique for patients in social or public occasions.

5. Disadvantages of JW

One of the most major concerns is aspiration of vomitus as the patient with JW cannot adequately open his/her mouth which may lead to asphyxia, aspirating pneumonia or even death. To our knowledge, no case report of vomit aspiration in a JW patient has been documented in medical or dental literature. Moreover, pioneer clinicians of JW strongly recommend that the JW patient must keep a wire cutter all the time to be used in emergency cases of nausea and vomiting.[18]

Another potential complication of prolonged JW is Temporomandibular joint Dysfunction (TMD) especially in individuals with preexisting parafunctional habits or malocclusions. The relationship between occlusal factors or orthodontic treatment and TMD is debatable and current evidence supports that neither occlusal factors nor orthodontics can cause TMD.[20] However, there is an urgent need for longitudinal studies comparing TMD prevalence and severity between patients with JW and controls.

Teeth decalcification around brackets, gingival inflammation and soft tissue trauma are well documented as undesirable side effects of any orthodontic treatment.[21,22] It could be speculated that OJW may be associated with a less orthodontic side effect as only lesser number of teeth are involved in the appliance with no elastics or complicated designs. Root resorption is not a possibility here as no active tooth movement is achieved in JW. Because of the relatively aggressive nature of conventional JW, more gingival and periodontal destruction is expected in this technique thus conventional JW for weight control should be avoided nowadays.

It should be emphasized that we do not advocate or discourage this highly controversial treatment tactic for obese subjects rather than we aimed at enriching the knowledge of the dental practitioner regarding this relatively mysterious issue among many dental practitioners. Providing dentist/orthodontist of this treatment modality should keep in mind the advantages and relative risks of JW and a case by case selection approach should be followed with close monitoring of the JW patient throughout the treatment period.

Conflict of interest

None.

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